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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|------------------------|---------------------|------------------|
| 10/659,748 | 09/11/2003 | Manabu Nakamura | 031140 | 3468 |
| 38834 7590 05/13/2008 WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP 1250 CONNECTICUT AVENUE, NW SUITE 700 WASHINGTON, DC 20036 | | | | |
| EXAMINER SMITH, BRADLEY | | | | |
| ART UNIT 2891 | | PAPER NUMBER | | |
| MAIL DATE 05/13/2008 | | DELIVERY MODE PAPER | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/659,748

Applicant(s)

NAKAMURA ET AL.

Examiner

Bradley K. Smith

Art Unit

2891

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-19 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-19 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-8508)
- Paper No(s)/Mail Date 12/4/07 2/11/08

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date: ____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 2, 3, 5, 6, 8, 11, 12, 14, 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent 5,423,944) in view of Dobuzinsky et al (US Patent 5,412,246) and Murakawa et al (US2007/0085154). Wong discloses forming a first insulation film using a strong acid solution on the face of the substrate. With regards to claims 6 and 12, Wong discloses the use of nitric acid (see column 1 lines 20-25). With regards to claim 8 and 14, Wong discloses the use of ozone in an acidic solution (see column 2 lines 50-65). However Wong fails to disclose forming a second insulation film by low temperature processing and cleaning (removing defects near the surface) the wafer (substrate) (see column 1 lines 20-25 and see column 2 lines 50-65) and the plasma processing with a radial line slot antenna through microwave excitation. Dobuzinsky et al. disclose the formation of a second dielectric layer using low temperature processing and Murakawa et al. disclose forming dielectric using plasma processing with a radial line slot antenna through microwave excitation (see abstract and [0007]) With regards to claims 2 and 3, Dobuzinsky et al. disclose using a low temperature oxidation plasma (see title). With regards to claim 5, Dobuzinsky et al. disclose forming an ONO film (see

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column lines 55-65). With regards to claims 11, 17 and 18 Dobuzinsky et al. disclose forming gate oxide films(see abstract). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wong Dobuzinsky et al and Murakawa et al. because the oxidizing agents such as nitric acid help remove defects (see Wong column 1 lines 20-25) and the radial slot line antenna will form a high quality film at low temperatures with fewer dangling bonds (see Murakawa et al. [0007]) .

2. Claims 7, 9,13, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent 5,423,944) in view of Dobuzinsky et al (US Patent 5,412,246) and Murakawa et al (US2007/0085154) as applied to claim 3 above, and further in view of Muramatsu et al. (US Patent 6,468,841). Wong Dobuzinsky et al and Murakawa et al disclose the forming of two insulation layers. However they fail to teach the use of nitric acid and an ozone containing solution (see above). Whereas Muramatsu disclose the use of nitric acid and an ozone containing solution at temperature of 420 degrees C (see column 10 line 5-16). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wong and Dobuzinsky et al and Murakawa et al in view of Muramatsu et al. because the oxidizing agents such as nitric acid help remove defects (see Wong column 1 lines 20-25) and the radial slot line antenna will form a high quality film at low temperatures with fewer dangling bonds (see Murakawa et al. [0007]) .

3. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent 5,423,944) in view of Dobuzinsky et al (US Patent 5,412,246) and Murakawa et al (US2007/0085154). Dobuzinsky et al Wong and Murakawa et al discloses the claimed invention

except for the first insulation film has a film thickness of 1nm or more. It would have been obvious to one of ordinary skill in the art at the time the invention was made to make an oxide film greater than one nanometer, because if the dielectric film were less than one nanometer it would lose its dielectric properties. In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device.

4. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (US Patent 5,423,944) in view of Dobuzinsky et al (US Patent 5,412,246) and Murakawa et al (US2007/0085154). Wong discloses forming a first insulation film using a strong acid solution on the face of the substrate. However Wong fails to disclose forming a second insulation film by low temperature processing after a fixed period of time and forming dielectric using plasma processing with a radial line slot antenna through microwave excitation. Dobuzinsky et al. disclose the formation of a second dielectric layer using low temperature processing after a fixed period of time, and then leaving the second dielectric layer for a fixed period of time and Murakawa et al. disclose forming dielectric using plasma processing with a radial line slot antenna through microwave excitation (see abstract). The examiner asserts that since the Dobuzinsky et al. forms the nitride after the oxide is formed inherently there is a fixed period of time and the nitride is left for a fixed period (otherwise distinct layer of silicon oxide and silicon nitride would not have been formed as shown in figure 59. Therefore it would have been obvious

to one of ordinary skill in the art at the time the invention was made to combine the teachings of Wong and Dobuzinsky et al Murakawa et al in view of because the oxidizing agents such as nitric acid help remove defects (see Wong column 1 lines 20-25) and the radial slot line antenna will form a high quality film at low temperatures with fewer dangling bonds (see Murakawa et al. [0007]) .

Response to Arguments

Applicant's arguments with respect to the rejection(s) of claim(s) Wong and Dobuzinsky under 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Murakawa et al.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bradley K. Smith whose telephone number is 571-272-1884. The examiner can normally be reached on 10-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bradley K Smith/
Primary Examiner, Art Unit 2891